REMARKS

Real Party in Interest

This application is assigned to Merck Patent Gesellschaft, by means of an assignment recorded at reel 012231 and frame 0740.

Related Appeals and Interferences

There are no related Appeals or Interferences.

Status of Claims

Claims 1-21 are pending. Claims 3 and 4 are withdrawn.

Status of Amendment

This Reply subsequent to Final Rejection presents amendments to claims 20 and 21 for entry. Minor corrections have been made to claims 20 and 21, in order to provide antecedent basis for terms used therein, and to correct an inadvertent error. Support for the amendment is evident for example, from Figure 2 of the present application.

Summary of Invention

The present invention is directed to a device for cooling heat-generating electrical or electronic components having a non-uniform output profile, comprising a heat-conducting unit (1) and a heat-absorbing unit which contains a phase change material (4), wherein the phase change material is arranged in such a way that heat flow from the electrical or electronic component is preferentially to the heat-conducting unit (1) and a majority of heat flow to the phase change material from the electrical or electronic component occurs only when the temperature of the heat-conducting unit (1) exceeds phase change temperature T_{PC} of the phase change material. See the specification at page 5, lines 13-16 and page 6, lines 15-19.

Issues

The issues remaining outstanding in the Final Rejection mailed January 28, 2004, are the rejections under 35 U.S.C §102 and 103.

Grouping of Claims

It is respectfully submitted that separate basis for patentability exists for claims 14-18, claims 17- 19 and claims 20-21.

Argument

As noted at page 2 of the Final Rejection, the rejection of claims 1, 2, 5-13 and 17-20 is "repeated" from the Office Action of September 9, 2003. In fact, as noted in Applicants' previous reply, only claim 1 was rejected under 35 U.S.C §102 in this Office Action. See item 3 on that page. It was previously assumed that this prior Office Action applied the rejection to various other claims specifically mentioned in the prior Office Action, claims 1, 2, 6, 7, 8, 14-21. However, based on the current Office Action, it is now assumed that claims 1, 2, 5-13 and 17-20 are included in this rejection. Clarification of this issue is *again* earnestly requested.

In any event, at least claim 1, and presumably the above claims, remain rejected under 35 U.S.C §102 over Laing. It will be recalled Laing discloses a cooling device for a semiconductor apparatus comprising a chamber enclosing a non-metallic crystal forming material which can undergo a phase change at a temperature which corresponds to the desired operating temperature of the semiconductor component. More specifically, the semiconductor component that is in heat

conductive communication is substantially thermally insulated (col. 2, lines 58-62). The operational nature of the Laing cooling device requires that there is a prerequisite temperature (optimum operating temperature of the semiconductor) which must be met before the crystal forming material will actually undergo the phase change and result in cooling (col. 2, lines 62-67). Moreover, the layers of the crystal forming material which are directly adjacent to the semiconductor will undergo a phase change and melt while those layers which are further removed from the semiconductor will remain substantially at room temperature (col. 2, line 67 - col.3, line 5).

Thus, in the Laing device, the electronic component is rapidly heated to the operating temperature, since, before that temperature is reached, the phase change material (in intimate contact therewith) does not dissipate heat. The semiconductor component of the Laing device is in fact considered substantially thermally insulated (col.2, lines 60-61). As a result, the device of Laing is clearly of the conventional sort of heat sink design where the phase change material first has to heat before the heat can be dissipated via the cooling fins. There can be no loss of heat from the system until the semiconductor reaches the critical optimum temperature, as is desirable where fast heat up to operating temperature is needed.

However, at page 3, the September 23, 2003 Office Action argues that Laing *does* disclose a device "wherein the phase change material is arranged in such a way that the heat flows from the electrical or electronic component is [sic] preferentially to the heat conducting unit 1 (see FIG. 1) and a majority of heat flow to the phase change material from the electrical or electronic component occurs only when the temperature of the conducting unit 1 exceeds phase change temperature of the phase change material." In actuality, this interpretation of FIG. 1 of the patent is impossible. In order for a majority of heat flow to the phase change material from the electronic component to occur *only* when the temperature of the conducting unit exceeds phase change temperature of the phase change material, there would have to be some means in the patent to prevent heat flow to the phase change unit unless the heat conducting unit (the fins in the patent) were at a temperature exceeding the phase change temperature of the phase change material. Since the path to the fins in the patent is *interrupted* by the phase change material, in order to insure that heat is not dissipated until the phase change temperature is reached, such interpretation of the drawing as in the Office Action is simply not possible.

While the Final Rejection argues that the fins are not only coupled to the phase change material but also to the electronic component, the he patent drawing clearly shows phase change material to be disposed between the electronic component and the fins. Thus, no heat flow can reach the fins until heat is dissipated by the phase change material, which dissipation does not occur until the phase change material reaches phase change temperature. Moreover, even if the situation was as described in the Final Rejection, heat would flow from the source to *both* the fins and the phase change material - not to the phase change material *only* when the temperature of the fins exceeds the phase change temperature of the phase change material.

Clearly, the patent drawing can neither anticipate nor suggest heat flow to the fins from the electrical or electronic component *only* when the temperature of the fins exceeds the phase change temperature. Instead, heat flow in the reference figure goes to the heat conducting unit (the fins) only *after* the temperature of the phase change material is exceeded. Thus, heat flow to the phase change material in the reference occurs *long before* the temperature of the heat conducting unit exceeds the phase change temperature of the phase change material. There simply cannot be an anticipation by the reference.

With respect to claims 2, and 5-13, mentioned at page 2 of the Final Rejection, these claims are dependent upon claim 1, and thus also cannot be anticipated by the reference.

With respect to claim 14, rejected under 35 U.S.C §102(b) over Laing at page 2 of the Final Rejection, as discussed above, the reference in no way discloses a device wherein heat flows from the heat source to the heat sink (the fins), and flows from the heat sink to the heat absorbing component when the heat sink temperature exceeds the phase change temperature of the phase change material. Instead, in the reference, heat flows from the phase change material to the heat sink, and only when the temperature of the phase change material is exceeded. Heat flow is not *from* the heat sink to the phase change material, as in claim 14, but quite the opposite. Thus, this claim also cannot be anticipated by the reference. Similar issues apply to claim 15, which is not included in the statement of the rejection at page 2 of the Final Rejection, but is apparently rejected none-the-less, based on the discussion at page 3 of this Office Action. While it is noted that, at page 3 of the Final Rejection, it is argued that "intended use" statements in the claims are not given any weight, the above noted language is *not* intended use but defines

orientation of the components of the device claimed. Thus, the orientation of the components, which directs heat flow in a way which is neither disclosed or suggested in the reference, must be given weight. In short, mapping of the heat flow path is a apparatus limitation.

With respect to claim 16, (also *apparently* rejected) similar issues apply. The prior art neither discloses nor suggests the *apparatus configuration* in which heat flows from the heat generating electric or electronic component to the heat sink, and from the heat sink to the heat absorbing component when the heat sink temperature exceeds the phase change temperature of the phase change material. The configuration disclosed in the reference is quite the opposite, as discussed above.

With respect method claims 17-19, as the reference cannot disclose a *method* for absorbing heat in which heat flows from a heat sink to a heat absorbing component when the heat sink temperature exceeds the phase change temperature of the phase change material, inasmuch as the flow in the reference is the opposite; heat flows from the phase change material to the heat sink only when the phase change temperature is exceeded. Similar issues apply to claims 18 and 19, which are dependent upon claim 17.

With respect to claims 20 and 21, these claims are dependent upon claims 1 and 14, respectively, and also are not anticipated as discussed above.

In conclusion, withdrawal of all of the rejections under 35 U.S.C §102 over Laing is respectfully requested.

Claims 9, 10, 11 and 12 apparently remain rejected under 35 U.S.C §102(b) or, in the alternative 103 over Maruyama, et al. '242. Reconsideration of this rejection is respectfully requested. It is again assumed, in fact, that this rejection is intended to be one over Laing *taken with* Maruyama, inasmuch as both references are discussed at page 6 of the September, 2003 Office Action. The deficiencies of Laing are discussed above and Maruyama does nothing to remedy the lack of a disclosure of an apparatus or method in which the components are structured so that heat flows as prescribed. Thus, this rejection should also be withdrawn.

Claim 5 also apparently remain rejected under 35 U.S.C §103 over Laing taken with Fitch, et al., '321. Reconsideration of this rejection is also respectfully requested. The deficiencies of Laing are discussed at length above. Fitch, cited solely for the use of a particular

phase change material, does nothing to remedy these deficiencies, and withdrawal this rejection is therefore also respectfully requested.

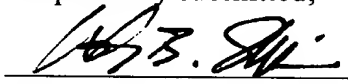
Claim 13 apparently remains rejected under 35 U.S.C §103 over Laing taken with Bunyan, et al. '198. As noted above, Bunyan is cited for a particular feature of a dependent claim, and does nothing to remedy the deficiencies of the primary reference. Thus, withdrawal of this rejection is also respectfully requested.

It is finally submitted that claims 20 and 21 are additionally patentable over the references, inasmuch as the references fail to suggest a device wherein the heat conducting unit (the fins) is in direct contact with the heat generating electric or electronic component, inasmuch as Laing, discussed above, disposes the phase change material between the heat conducting unit and the heat generating unit.

It is therefore respectfully submitted that the claims of the application are in condition for allowance, and passage to issue is respectfully requested. However, if the Examiner has any questions or comments, he or she is cordially invited to telephone the undersigned at the number below.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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